AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (Currently Amended) A semiconductor storage device comprising:

a first conductivity type semiconductor substrate, a first conductivity type well region provided in a semiconductor substrate, or a first conductivity type semiconductor film disposed on an insulator;

a gate insulating film formed on the first conductivity type semiconductor substrate, the first conductivity type well region provided in the semiconductor substrate, or the first conductivity type semiconductor film disposed on the insulator;

a single gate electrode formed on the gate insulating film;

two charge holding portions formed on sides of side walls of the single gate electrode;

a channel region disposed under the single gate electrode; and

second conductivity type diffusion layer regions disposed on both sides of the channel region, wherein

the charge holding portions are structured so as to change a current amount flowing between one of the second conductivity type diffusion layer regions and the other of the second conductivity type diffusion layer regions when voltage is applied to the gate electrode by an amount of electric charges stored in the charge holding portions, ~~wherein~~

a reference voltage is applied to the other of the second conductivity type diffusion layer regions,

a first voltage is applied to the one of the second conductivity type diffusion layer regions, ~~and~~

a second voltage is applied to the gate electrode such that carriers are injected into the charge holding portion existing on the side of the one of the second conductivity type diffusion layer regions,

the second conductivity type diffusion layer regions are respectively offset relative to edges of the single gate electrode,

no electrode exists on each of the two charge holding portions, and

the two charge holding portions are respectively located above part of the channel region and part of each of the second conductivity type diffusion layer regions.

2. (Previously Presented) The semiconductor storage device as defined in Claim 1, wherein

a third voltage is applied to the first conductivity type semiconductor substrate, the first conductivity type well region provided in the semiconductor substrate, or the first conductivity type semiconductor film disposed on the insulator.

3. (Previously Presented) The semiconductor storage device as defined in Claim 1, wherein

the first conductivity type is P type,

the second conductivity type is N type,

the carriers are positive holes,

the first voltage is higher than the reference voltage, and

the second voltage is lower than the reference voltage.

4. (Previously Presented) The semiconductor storage device as defined in Claim 1, wherein

the first conductivity type is N type,

the second conductivity type is P type,

the carriers are electrons,

the first voltage is lower than the reference voltage, and

the second voltage is higher than the reference voltage.

5. (Previously Presented) The semiconductor storage device as defined in Claim 1, wherein

the second conductivity type diffusion layer regions have an offset structure without an overlap region overlapping the gate electrode with interposition of the gate insulating film.

6. (Previously Presented) The semiconductor storage device as defined in Claim 2, wherein

an absolute value of voltage difference between the second voltage and the third voltage is 0.7V or more and 1V or less.

7. (Previously Presented) The semiconductor storage device as defined in Claim 2, wherein

a gate length of the gate electrode is 0.015 μm or more and 0.5 μm or less.

8. (Currently Amended) The semiconductor storage device as defined in Claim 1, wherein

the charge holding portion is composed of a first insulator, a second insulator, and a third insulator,

the charge holding portion has a structure in which a film composed of the first insulator having a function of storing electric charges is interposed between the second insulator and the third insulator,

the first insulator is silicon nitride, ~~and~~

the second and third insulators are silicon oxide.

9. (Previously Presented) The semiconductor storage device as defined in Claim 8, wherein

a thickness of the film composed of the second insulator on the channel region is smaller than a thickness of the gate insulating film and is 0.8 nm or more.

10. (Previously Presented) The semiconductor storage device as defined in Claim 8, wherein

a thickness of the film composed of the second insulator on the channel region is larger than a thickness of the gate insulating film and is 20 nm or less.

11. (Previously Presented) The semiconductor storage device as defined in Claim 8, wherein

the film composed of the first insulator having a function of storing electric charges includes a portion having a surface that is approximately parallel to a surface of the gate insulating film.

12. (Previously Presented) The semiconductor storage device as defined in Claim 11, wherein

the film composed of the first insulator having a function of storing electric charges includes a portion extending in direction approximately parallel to a lateral side of the gate electrode.

13. (Previously Presented) The semiconductor storage device as defined in Claim 1, wherein

at least part of the charge holding portion is formed so as to overlap part of the second conductivity type diffusion layer region.

14. (Currently Amended) The semiconductor storage device as defined in Claim 2, wherein

the first conductivity type is P type,

the second conductivity type is N type,

the carriers are positive holes,

the first voltage is higher than the reference voltage, ~~and~~

the second voltage is lower than the reference voltage, and

the third voltage is higher than the reference voltage.

15. (Currently Amended) The semiconductor storage device as defined in Claim 2, wherein

the first conductivity type is N type,

the second conductivity type is P type,

the carriers are electrons,

the first voltage is lower than the reference voltage, ~~and~~

the second voltage is higher than the reference voltage, and

the third voltage is lower than the reference voltage.

16. (Previously Presented) The semiconductor storage device as defined in Claim 15, wherein

an absolute value of voltage difference between the second voltage and the third voltage is 0.7V or more and 1V or less.

17. (New) A semiconductor storage device comprising:

a first conductivity type semiconductor substrate, a first conductivity type well region provided in a semiconductor substrate, or a first conductivity type semiconductor film disposed on an insulator;

a gate insulating film formed on the first conductivity type semiconductor substrate, the first conductivity type well region provided in the semiconductor substrate, or the first conductivity type semiconductor film disposed on the insulator;

a single gate electrode formed on the gate insulating film;

two charge holding portions formed on sides of side walls of the single gate electrode;

a channel region disposed under the single gate electrode; and

second conductivity type diffusion layer regions disposed on both sides of the channel region, wherein

the charge holding portions are structured so as to change a current amount flowing between one of the second conductivity type diffusion layer regions and the other of the second conductivity type diffusion layer regions when voltage is applied to the gate electrode by an amount of electric charges stored in the charge holding portions,

a reference voltage is applied to the other of the second conductivity type diffusion layer regions,

a first voltage is applied to the one of the second conductivity type diffusion layer regions,

a second voltage is applied to the gate electrode such that carriers are injected into the charge holding portion existing on the side of the one of the second conductivity type diffusion layer regions,

a third voltage is applied to the first conductivity type semiconductor substrate,

the first conductivity type well region provided in the semiconductor substrate, or the first conductivity type semiconductor film disposed on the insulator,

the first conductivity type is P type,

the second conductivity type is N type,

the carriers are positive holes,

the first voltage is higher than the reference voltage,

the second voltage is lower than the reference voltage, and

the third voltage is higher than the reference voltage.

18. (New) A semiconductor storage device comprising:

a first conductivity type semiconductor substrate, a first conductivity type well region provided in a semiconductor substrate, or a first conductivity type semiconductor film disposed on an insulator;

a gate insulating film formed on the first conductivity type semiconductor substrate, the first conductivity type well region provided in the semiconductor substrate, or the first conductivity type semiconductor film disposed on the insulator;

a single gate electrode formed on the gate insulating film;

two charge holding portions formed on sides of side walls of the single gate electrode;

a channel region disposed under the single gate electrode; and

second conductivity type diffusion layer regions disposed on both sides of the channel region, wherein

the charge holding portions are structured so as to change a current amount flowing between one of the second conductivity type diffusion layer regions and the other of the second conductivity type diffusion layer regions when voltage is applied to the gate electrode by an amount of electric charges stored in the charge holding portions, wherein

a reference voltage is applied to the other of the second conductivity type diffusion layer regions,

a first voltage is applied to the one of the second conductivity type diffusion layer regions,

a second voltage is applied to the gate electrode such that carriers are injected into the charge holding portion existing on the side of the one of the second conductivity type diffusion layer regions,

a third voltage is applied to the first conductivity type semiconductor substrate, the first conductivity type well region provided in the semiconductor substrate, or the first conductivity type semiconductor film disposed on the insulator,

the first conductivity type is N type,

the second conductivity type is P type,

the carriers are electrons,

the first voltage is lower than the reference voltage,

the second voltage is higher than the reference voltage, and

the third voltage is lower than the reference voltage.